

## **CLAIMS:**

### **1) An electrical coil comprising:**

a pair of electrical conductors having about;

equal resistance,

equal cross sectional area,

equal length,

wherein the electrical conductors, when assembled in parallel,

follow about the same path,

wherein the two electrical conductors

are disposed in physical contact with each other along about the entire path,

but are electrically separated; and

a control circuit adapted to generate respective currents in each of electrical conductors,

wherein the following conditions are satisfied,

- 1) the respective electrical currents, when summed, will produce a desired resultant field, and
- 2) a power resultant from one of the electrical currents and resistance of the respective electrical conductor, when summed with another power resultant from the other of the electrical currents and resistance of the respective electrical conductor, will produce a desired total power within the electrical coil.

### **2) An electrical coil placed in a magnetic field, the electrical coil comprising:**

a pair of electrical conductors having about,

equal resistance,

equal cross sectional area,

equal length,

wherein the electrical conductors, when assembled in parallel,

follow about the same path,

wherein the two electrical conductors

are disposed in physical contact with each other along about the entire path,

but are electrically separated; and

a control circuit adapted to generate:

a current within one of the electrical conductors, and  
another current within the other of the electrical conductors,  
wherein the following conditions are satisfied,

- 1) a force resultant from the interaction of the magnetic field with one of the electrical currents, when summed together with another force resultant from the interaction of the magnetic field with the other of the electrical currents, will produce a desired resultant force, and
- 2) a power resultant from one of the electrical currents and the resistance of the respective electrical conductor, when summed together with another power resultant from the other of the electrical currents and the resistance of the respective electrical conductor, will produce a desired total power within the electrical coil.

3) The coil according to claim 1 wherein the control circuit comprises:

a digital computer adapted to calculate a value, proportional to the one of the electrical currents in one of the electrical conductors and another value, proportional to the other of the electrical currents in the other of the electrical conductors;

a digital to analog conversion circuit adapted to convert the calculated value for one of the electrical currents into to an analog signal and another digital to analog conversion circuit adapted to convert the calculated value for the other of the electrical currents into another analog signal and;

a circuit adapted to convert one of the analog signals into one of the electrical currents and apply it to the respective electrical conductor and another circuit adapted to convert the other of the analog signals into the other of the electrical currents and apply it to the other of the respective electrical conductor.

4) The coil according to claim 2 wherein the control circuit comprises:

a digital computer adapted to calculate a value, proportional to the one of the electrical currents in one of the electrical conductors and another value, proportional to the other of the electrical currents in the other of the electrical conductors;

a digital to analog conversion circuit adapted to convert the calculated value for one of the electrical currents into to an analog signal and another digital to analog conversion circuit adapted to convert the calculated value for the other of the electrical currents into another analog signal and;

a circuit adapted to convert one of the analog signals into one of the electrical currents and apply it to the respective electrical conductor and another circuit adapted to convert the other of the analog signals into the other of the electrical currents and apply it to the other of the respective electrical conductor.